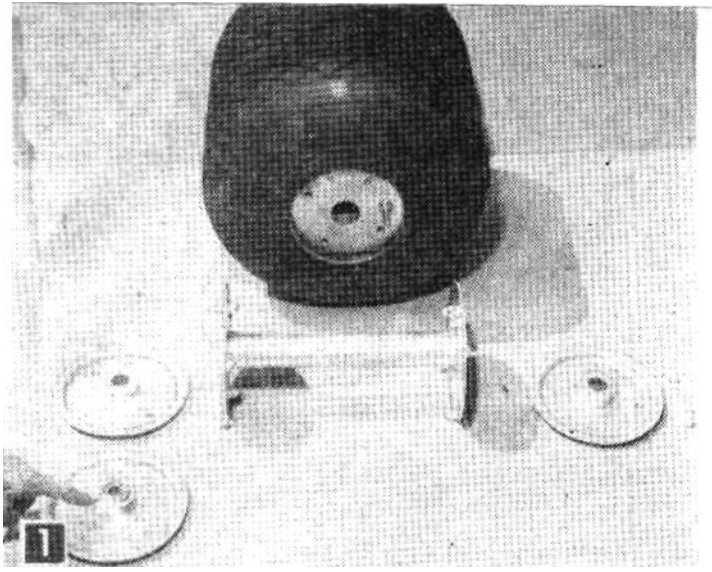
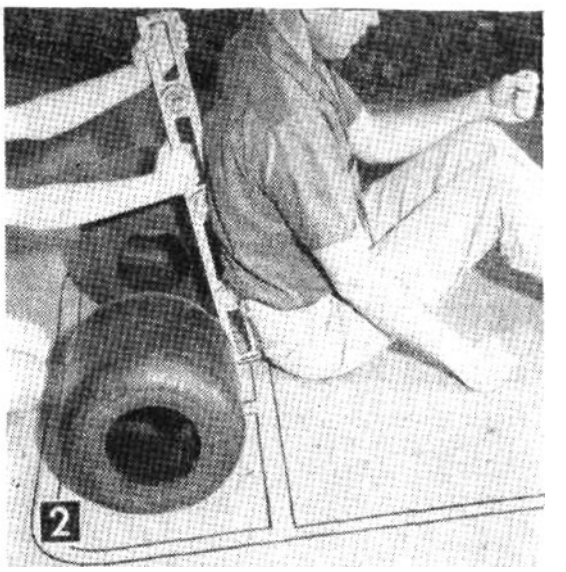
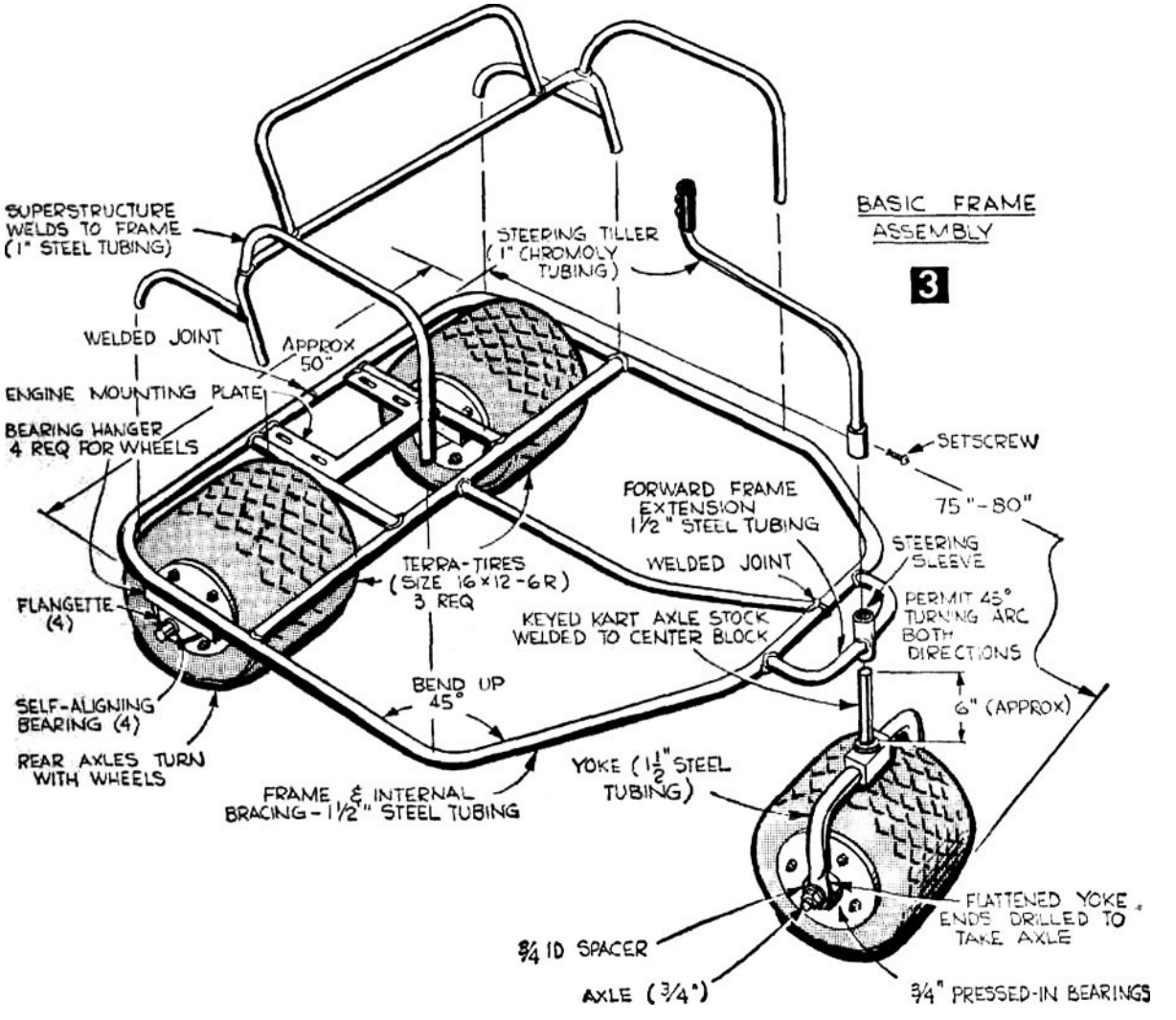
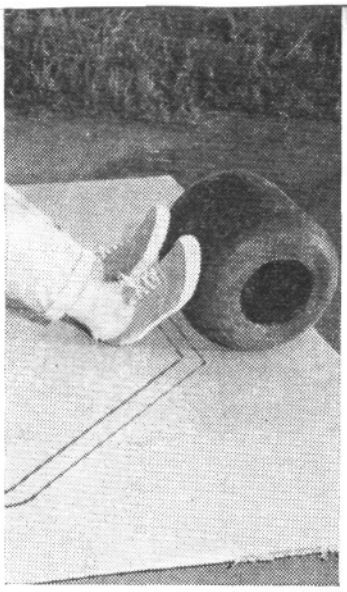




Build A Motorized Mountain



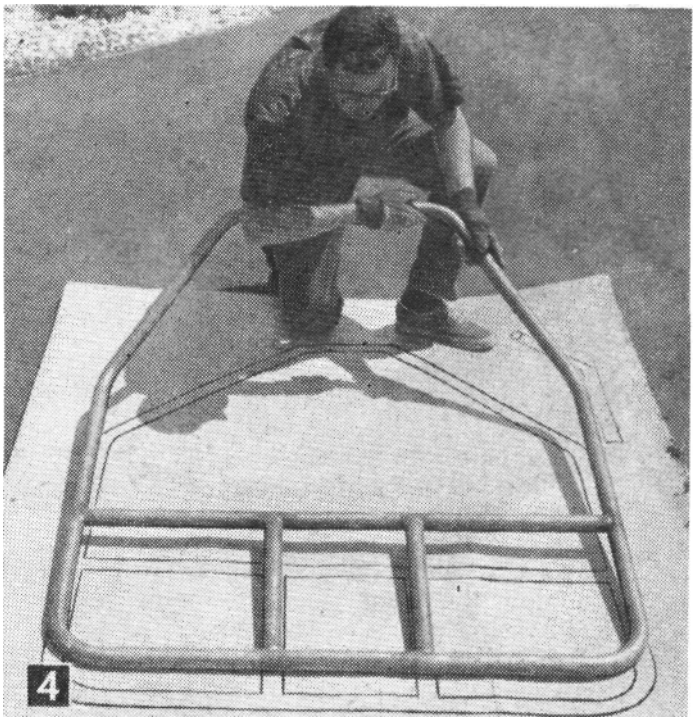


By V. LEE OERTLE

HERE'S the going-est buggy a fellow could want. It's wilderness transportation to delight the heart of the amateur geologist, weekend prospector or straight-out sportsman who's looking for rugged wheels for rugged terrain. It can be built for about $300 more or less—depending on how many used parts can be substituted for new ones—and a few weekends of work.

Your First Step will be to draw a full-size cardboard pattern for the Goat's frame. In doing so certain dimensions, especially regarding clearances, should be borne in mind. These include the size of the tires, wheels and engine; the space the drive chains and sprockets will require to clear the frame; and your own individual requirements for space and comfort.

The tires will be your biggest expense, running roughly $120, with wheels, for three complete ready-to-go units. The three tires used on the Goat are Goodyear Terra-Tires with bolt-on flanges (Fig. 1). These are tubeless jobs that operate at air pressures of from 1 to about 15 *psi*, depending on the terrain. They enable the Goat to claw its way



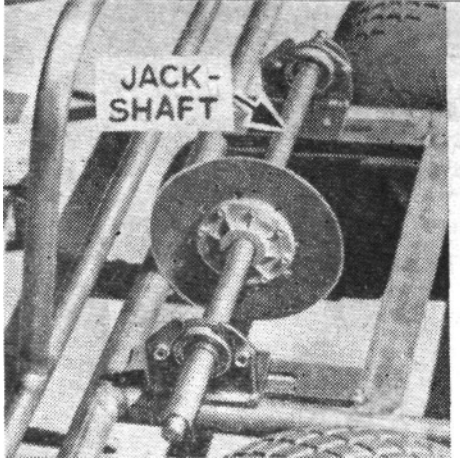


FIG. 5: Jack-shaft is section of 1" kart axle keyed to accept sprockets. Note self-aligning bearings on the bearing hangers.

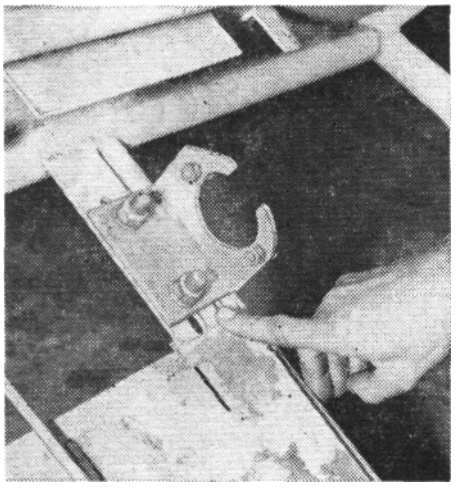


FIG. 6: Bearing hangers for jack-shaft bolt to slotted braces so hangers can be moved up or down by loosening four 1/2" bolts.

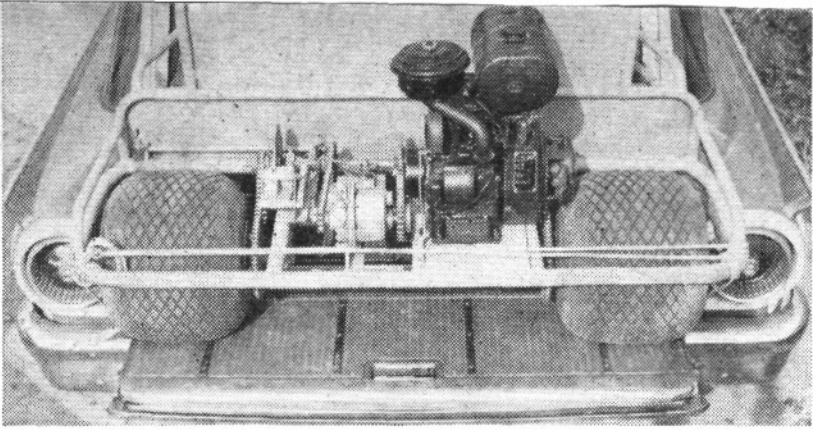
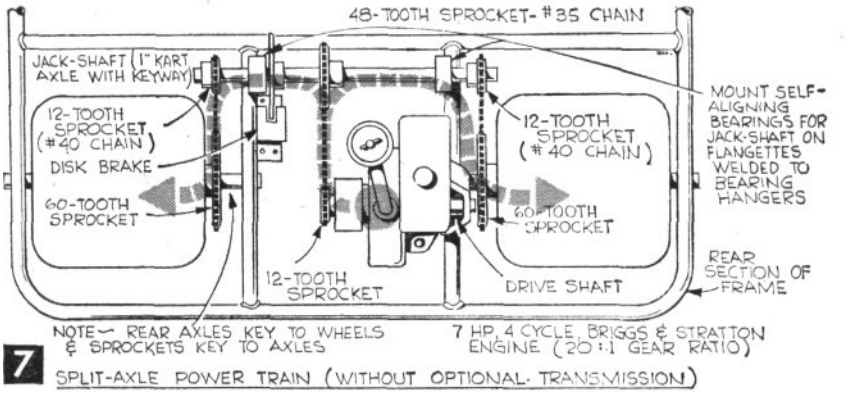


FIG. 7: Split-axle power train permits more ground clearance under frame. Also, the Goat will keep going if one jack-shaft-to-wheel chain breaks.



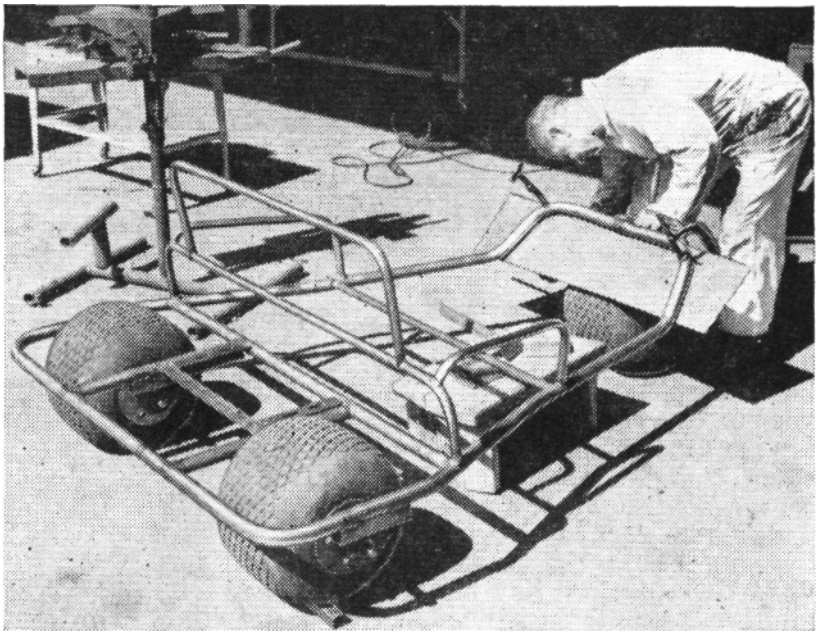


FIG. 8: Clamp piece of floor steel to frame to check 45° turning angle.

over sand, mud, snow, rocks and other obstacles that would stop other vehicles dead. Tire size for the Goat: 16x12—6R.

When you have made your engine-compartment measurements on your pattern you can estimate the Goat's overall length by sitting down on the pattern at the point where the seat will be situated and drawing up your legs to a comfortable position. Then mark the spot behind your heels and add 2 in. to allow room for the seat-back cushion. Overall length of the Goat, including the front wheel, probably will be 75 to 85 in., which is average.

Kart parts can be used almost exclusively to make this type buggy. Standard-size parts are quite cheap. Buy your materials from a local kart shop or through a mail-order house and you'll save money.

Frame. The frame is made of 1015-grade cold-rolled steel tubing having a wall thickness of .083 to .120 in. with an outside diameter of 1-1/2-in. Instead of being all-welded it is *bent* to shape following the full-size pattern.

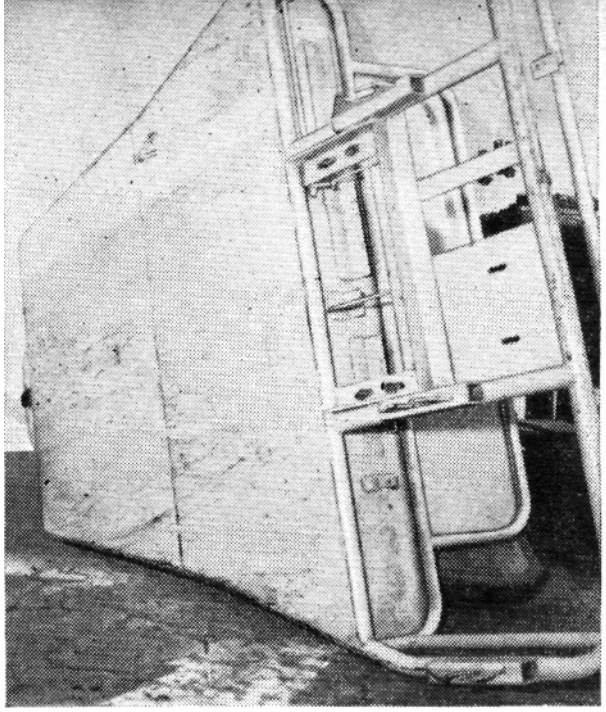


FIG. 9: Weld 16-gauge-steel floor to frame bottom. Install crosswise so that scrap pieces can be used.

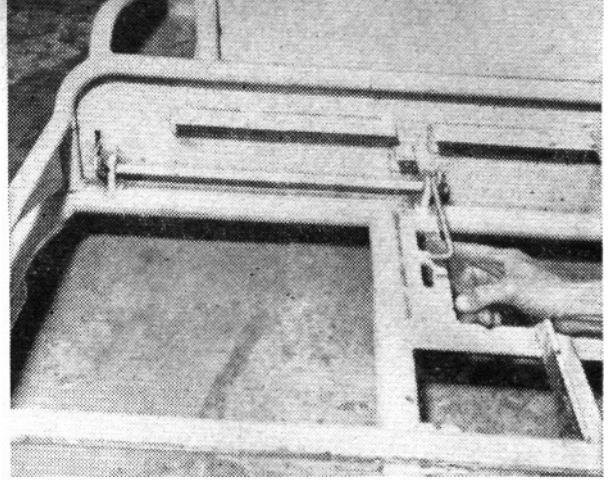
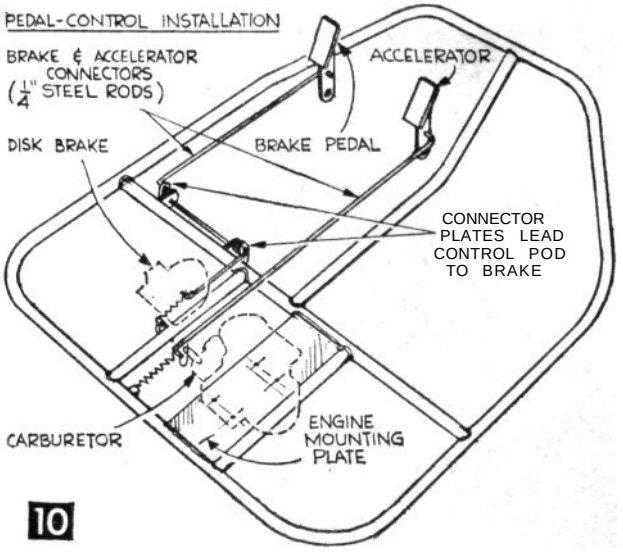


FIG. 10: Brake and throttle control rods are 1/4" steel. Connector plates permit offsetting these controls.



Check out your sketch by sitting down on the pattern and trying to visualize the locations of steering tiller, seat back and wheels (Fig. 2). If the sitting position seems cramped, extend the front radius a little. And make sure two persons can sit within the sides of your pattern. Then take the pattern to a tube bender.

The cost for the frame-bending job will range from $15 to $25. The recommended method for bending the frame is to have it bent up in two sections, then joining the sections with a welded joint at the front of the frame and another at the rear (Fig. 3).

After bending, check your frame against the original pattern (Fig. 4) for any variations that may have resulted. Don't worry if the dimensions are not precise (you can allow for some error in both length and width). The important thing is to make sure the frame is aligned correctly fore and aft so that the Goat will steer and track properly.

Superstructure. Any Goat you build will require a superstructure to support the seats and arm rests. This can be bent from smaller tubing, such as 1-in. cold-rolled steel, then welded in place.

Gear Ratios. To calculate your gear ratios divide the number of teeth of the clutch sprocket into the number of teeth on the jack-shaft sprocket; for example: 12 into 36 equals a ratio of 3:1. Do the same with the jack-shaft-to-axle sprockets; for example: 12 into 60 equals a 5:1 ratio. Now multiply the clutch ratio by the axle ratio, as: 3:1x5:1 equals a 15:1 ratio—the same as was installed on my own Goat. However, I recommend a gear reduction of at least 20:1. This would require the following six sprockets: (1) a 12-tooth sprocket on each end of the jack-shaft; (2) a 60-tooth sprocket on each rear axle; (3) a 48-tooth sprocket on the jack-shaft; and (4) a 12-tooth sprocket on the engine clutch.

Drive Chains. The jack-shaft-to-wheel drive chains should be #40s. The engine-clutch drive chains can be #35s.

Jack-Shaft. The jack-shaft (Fig. 5) is simply a section of old 1-in. kart axle. Such axles are already keyed to accept standard sprockets and brake systems. Use standard self-aligning axle bearings to support the jack-shaft, and bolt the flangettes onto standard bearing hangers. The latter can be made adjustable using the simple sliding-bracket arrangement shown in Fig. 6.

Split-Axle Power Train. By using a pair of stubby axles instead of one long one the Goat will have greater ground clearance and fewer projections (Fig. 7). The parts needed for *one* rear-axle assembly include axle, nut, flangettes with self-aligning bearings, locking collar and chain sprocket. The axles are suspended in the self-aligning bearings which

(Continued on page 120)

Build a Motorized Mountain Goat . . . . (Continued from page 83)

in turn are supported by flangettes, the latter bolted through steel bearing hangers welded to the underside of the frame.

Both rear wheels have 1/4" x 1/4" keys cut inside the flanges to permit keying to the axles. The rear-axle sprockets are also keyed to the axles so that when the jack-shaft rotates, a drive chain turns the power sprocket. Both rear axles are "live"; that is, they rotate with the wheels. The front wheel, on the other hand, turns freely in 3/4-in. pressed-in bearings.

Steering. To determine your ground-clearance requirements place the frame atop some boxes at the desired height to see where the front wheel will go (Fig. 8). When positioning this wheel, clamp a piece of floor-pan steel temporarily to the underside of the frame to be sure there will be enough clearance to permit the wheel a 45° turning angle in both directions.

Make the U-shaped front-wheel yoke from the same l-1/2-in. tube stock used for the frame. Flatten out the end of the yoke's U and drill holes through each to take, say, a 3/4-in. axle. Now chop off a length of kart axle (with keyway) and weld this onto the top of the center block welded to the yoke. This piece of axle stock will ride in the neck of the steering sleeve. The sleeve can be of any heavy metal having a minimum wall thickness of .125 in. with an inside diameter of 1 in. It is welded into position on the forward end, or extension, of the frame.

The tiller handle can be bent of 1-in. cold-rolled or chromoly tubing, preferably the latter. Weld a 2-in. piece of steering-sleeve tubing to the base of the tiller so that it can be slipped over the yoke shaft. Use set screws to tighten it on.

Engine. Four-cycle engines provide the best power in the low-gear ranges. Geared down to 20:1, a 7-hp Briggs & Stratton mill will drive the Goat, with two people aboard, up anything short of a 45° grade. At this ratio you'll get about 10 *mph* on hard flatlands and roads.

Jack-Shaft Bearing Hangers are welded to the 1/8-in. steel plates forward of the engine mounting plate. A slotted brace (Fig. 6) under the hanger allows the jack-shaft to be moved forward or back by loosening four 1/2-in. bolts. This adjustment is necessary for the fitting, adjustment and removal of the drive chains.

Floor Pan. Fabricate the floor pan from standard-width 16-gauge steel. Run the strips *across* the bottom of the frame (Fig. 9), weld the seams and weld the edges to the bottom of the frame's tubing. By running the floor pan across instead of lengthwise you can get away with using narrower scrap pieces and avoid having to buy extra-wide sheet steel.

The Connectors to brake and throttle controls can be lengths of 1/4-in. steel rod. Weld 2-in. steel connector plates onto the ends of the rods to allow offset connections to be led to the desired control. Simple gussets welded to the frame serve to anchor the rods. Also be sure the rods turn freely inside predrilled holes. The brake-rod installation shown in Fig. 10 is activated by a foot pedal.

Now slap on a coat of primer paint and take your Goat out for a test run through the country. You will find that your Terra-Tires will take you over the sandiest terrain without bogging down. The front-wheel steering should give you excellent control with light arm pressure. And you will discover that your little *7-hp* plant has all the spirit you could desire. •

MATERIALS LIST-
MOTORIZED MOUNTAIN GOAT*

Amount	Size & Description
	FRAME
30' (approx.)	1015-grade, 1'/₂" od cold-roll steel tubing
25' (approx.)	1" cold-roll steel tubing (superstructure)
	hardware, pipe suppliers
	TIRE-WHEEL UNITS
3	Terra-Tires (with wheels) size 16x12—6R
	Goodyear Tire & Rubber Co., Akron, 0. Geneva Wheel Co., Geneva, 0. ($38.69 per unit) GP Enterprises, 152 Huntington Dr., Monrovia Calif. ($19.95)
	ENGINE
1	Briggs & Stratton, 7-hp, 4-cycle power unit
	SPROCKETS
2	12-tooth for each end of jack-shaft
2	60-tooth for each rear axle
1	48-tooth for jack-shaft
1	12-tooth for engine clutch
	kart shops, mail order houses
	REAR AXLES
2	split-axle power train
	DRIVE CHAINS
2	#40s for lower-end installation
2	#35s, clutch-to-jack-shaft
	kart shops, hardware
	JACK-SHAFT
1	used kart axle with keyway; 1" dia., 3-4' long
	kart shops
	STEERING
1	front axle; short section of *3/4"* kart axle
1	front-wheel yoke; l-1/2" cold-roll steel tubing
1	tiller; 1" dia. chromoloy tubing (steering handle)
	kart shops, hardware
	CONTROLS
1	brake control; 3/8" dia., 16" long steel rod
1	throttle control; 3/8" dia., 16" long steel rod
	kart shops, hardware
	MISC.

Other parts incl. clutch, steel-disk brake assembly, floor pan (16-ga. sheet steel), self-aligning bearings (8—with hangers), flangettes, gussets. controls and pedals ($10), and frame bending and welding charges.

*Design of the Mountain Goat is such that considerable leeway is afforded the builder in making innovations. For that reason this Materials List need not be considered mandatory, since additions, such as transmission, bumpers, etc., may want to be made by individual builders.